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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in means for Cutting Off Lengths of Material Accurately

We, SPEEDEX (ENGINEERING) LIMITED, of North Lane, Leeds 6, in the County of York, a British Company, do hereby declare the invention for which we pray that a Patent 5 may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for cutting material during linear travel, e.g., so-called travelling saws, for cutting into lengths continuously extruded or other preformed material. Such apparatus usually includes a pendulum saw, a saw having an arcuate movement, or a cross-cut saw, mounted on a travelling carriage which is fitted with material holding clamps and which carriage is capable of moving at a material feeding or extrusion speed.

The term "material" as used herein refers to tubing or circular or other sectional material, solid bars, rods or the like, channels and other sectional shapes, which material is fed as a long length to be cut into sections of a given length.

When these machines work on an automatic cycle they are often provided with a separate stationary run-out or discharge table to receive the cut lengths. Such tables are frequently fitted with limit switch or light beam means to initiate the cutting cycle. The machines are also often fitted with means for the automatic ejection or removal of the cut lengths.

Machines of this type are generally required to cut lengths from say a few inches to about twenty feet and with conventional machines there is a gap between the cutting carriage and run-out table. It will be understood the said gap varies in distance during the course of every cycle due to the relative movement between carriage and table. This is most troublesome when attempting to cut

equal lengths to accurate measurements or fine tolerances and this is particularly so when trying to cut pieces shorter than twice the distance of the gap. 45

The main object of the present invention is to overcome the above problem and generally provide improved cutting apparatus. 50

Accordingly there is provided apparatus for cutting material into sections of predetermined length during linear travel, including a section cutting part and a material supporting table mounted in advance of said part to support a section of material to be cut, said parts being associated to have simultaneous linear movement with and at the same speed as the material fed thereto, said section cutting part including a guided movable carriage supporting a movable driven cutting element and operating means for causing said element to cut through the material, means on said carriage for clamping the material for a cutting operation and for the transmission of forward movement from the material to the carriage, and adjustable section length determining means mounted to be adjustable, for setting purposes, in relation to the cutting element and to remain constantly in such set relative position until readjusted, said determining means being arranged to control the clamping and the cutting of the material into successive sections of predetermined equal length. 55 60 65 70 75

The apparatus includes a construction wherein the guided movable carriage is provided with a table which is slotted for the working movements of the cutting element which comprises a driven disc saw mounted to move up through the table and material for the cutting operation. 80

The guided movable carriage may be mounted to be released to move forwardly with material being fed to the apparatus when said material has been clamped. Means for 85

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assisting said forward movement and means for returning said carriage to its starting position are provided.

The invention will now be more particularly described with reference to the accompanying drawings, in which:—

Fig. 1 is a part sectional substantially diagrammatic side view of the cutting apparatus with three extension tables;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a perspective view of the apparatus without one extension table;

Fig. 4 is an enlarged perspective view of the material clamping and guiding means; and

Fig. 5 is an enlarged view of another form of clamping and guiding means.

In an embodiment of the invention as shown in Figs. 1 and 2 a carriage 1 is mounted to be free running on horizontal guides 2 of a structure 3 which houses and carries at least some of the controls and working parts. The structure includes four corner pillars 4 which are telescopic for screw adjustments to be made for levelling and/or adjusting the structure to a required working height. The carriage has a flat table 5 slotted at 6 to allow a disc saw 7 to be swung up through the slot and cut through material clamped on the table. The disc saw may be driven continuously or intermittently by an electric motor. The saw 7 is carried by a pivoted arm 8 operated by a piston and cylinder unit 9 and the saw arcuate movements can be controlled by limit switches in known manner. Also the saw feed movements may be controllable in speed to suit the type of material being cut. The carriage 1 can be urged in a forward direction by a wire or chain 10 being anchored to the carriage and furnished with weight means 11 which can be varied at will. Normally the table is held in its starting position by a latch 12 pivoted to the structure 3 and releasable by a piston and cylinder unit 13. Material fed onto the table 5 can be automatically clamped in a variety of ways. As indicated a pair of upright guide pillars 14 are mounted in bearings 14a secured on top of the table 5 and carry a bridge piece 15 which can be adjustable, for setting, in predetermined stages vertically. The pillars have spaced apart annular grooves 16 into which locking levers 17 on the bridge piece can be turned to secure the latter in position after adjustment on the pillars 14. The pillars are given downward clamping movements and upward releasing movements by means of a piston and cylinder unit 18 operating a bar about its axis to operate two sets of links attached to the pillars. The bridge piece 15 carries clamps 19 adjustable therealong whereupon they can be secured. The arrangement is such that a pair of clamps can be arranged, or a single clamp, on either or both sides of the longitudinal centre of material being fed

onto the carriage. Such a single clamp will lie on one or the other side of the saw 7 and a pair of clamps will lie one on each side of such saw according to clamping requirements. In this way material can be securely held at the cutting position to ensure clean cutting actions. It will be understood the clamps 19 may have various shapes to suit the material being cut and depending on its sectional shape. Further guide means may be provided for the material such for example as the side guide plates 20 whose spindles are adjustable in the guide brackets 21 secured on the table 5. It will be understood that instead of plates 20 being used, blocks, or other shaped elements, may be employed. In Fig. 5 another form of clamping means is shown wherein the bridge piece 15 carries an angle section bracket 22 from which an internal clamping block 23 is suspended by one or more spring-loaded bolts 24. Such bracket also has resilient pads 25 on its underside which can engage on top of channel section material 26. A pair of side block guides 27 are provided to be adjustable in the brackets 21 in advance of the saw and a different shape of side guide element 28 can be provided on the far side of the saw 7 to be carried by the other bearing brackets 21.

To the aforesaid carriage table 5 is hinged a material supporting table 29 and this is furnished with a central underneath guide rail 30 to rest on a roller 31 carried by an adjustable stand 32. Depending upon the length of the material to be cut such table can be extended by further tables 29a. Each additional table can be anchored to the preceding table and the supporting stand 32 can be positioned where most convenient. With this arrangement it will be appreciated that when the carriage table moves, table 29, and any additional table 29a, will move therewith as one unit. The table 29, or a table 29a, as shown in Figs. 1 and 2, is furnished with a pivoted trip element 33 against which material will press and in so doing operate electrical or pneumatic means, such as pilot valve 34 of a pneumatic system for causing certain operations to take place. This element 33 can be adjustable along the table 29a (or the table 29) according to the length of section to be cut. In advance of this trip element two photoelectric switch elements 35 are arranged and whilst these can be mounted for adjustment on a table 29 or 29a they are conveniently carried by the bracket 36, adjustably secured to the table 29a (or table 29), and a bracket 37 on the end of the horizontal bar 38 carried by the bracket 36 to act as a guide bar over the table for slidably guide ejection means 39. Such means 39 normally lies pendantly and centrally of the table to assist the material in keeping a straight line and when a section has been cut such means 39 can be automatically operated by a piston and cylinder

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der unit 40, in the aforesaid system controlled by valve 34, to have movement on the bar 38 and thus push a cut section laterally off the table. To ensure bodily movement of a cut section duplicate guide-ejection means 39 may be furnished in advance of the aforesaid unit as shown.

With the above apparatus material can be extruded or fed onto the carriage which will be latched in its starting fully retracted position. Such material will continue moving over the table 5, table 29 and any tables 29a until the end thereof passes through the light beam of elements 35 whereupon the clamps 19 will automatically grip the material, the latch 12 will release the carriage, and thus the carriage will start to move forwardly at extrusion or material feeding speed. The disc saw is caused to rotate (unless it is of the continuously running type) and is operated to swing up through the slot 6 in table 5 and cut through the material whilst the carriage is still moving. The disc saw returns to its starting position and the clamps are released. The carriage is then returned to its starting position by the operation of a piston and cylinder unit 41 for it to be re-engaged by the latch 12. Such release of the material will cause the uncut material, still being fed, to push the cut section forwardly until it touches the pivoted trip element 33 which will operate the pilot valve, or limit switch 34, which will cause the ejectors to work and thrust the cut section bodily from the supporting table. The apparatus is now ready for the whole cycle to commence again and such cycles will continue until there is no more material fed thereto or the apparatus is stopped.

It will be understood that other section length determining means may be used instead of photo-electric cell means, as electric micro or other switch means may be operated or acoustic sensing-switching or proximity gauge means may be used. Also, some other arrangement may be used for causing automatic ejection and if desired the sections may be ejected over the end of the table 29 or 29a. Moreover, although a driven saw disc is very suitable for this apparatus, other cutting means may be used, such as band saw or knife, a knife or guillotine, a heated wire or the like, all of which are generally included in the term movable cutting element.

WHAT WE CLAIM IS:—

- 55 1. Apparatus for cutting material into sections of predetermined length during linear travel, including a section cutting part and a material supporting table mounted in advance of said part to support a section of material to be cut, said parts being associated to have simultaneous linear movement with and at the same speed as the material fed thereto, said section cutting part including a guided movable carriage supporting a movable driven cutting element and operating means for causing
- 5 70 said element to cut through the material, means on said carriage for clamping the material for a cutting operation and for the transmission of forward movement from the material to the carriage, and adjustable section length determining means mounted to be adjustable, for setting purposes, in relation to the cutting element and to remain constantly in such set relative position until readjusted, said determining means being arranged to control the clamping and the cutting of the material into successive sections of predetermined equal length.
- 10 75 2. Apparatus according to claim 1, wherein the guided movable carriage is provided with a table which is slotted for the working movements of the cutting element which comprises a driven disc saw mounted to move up through the table and material for the cutting operation.
- 15 80 3. Apparatus according to claim 1 or 2, wherein the material supporting table carries section length determining means adjustable therealong for section length setting purposes, said means being of the electrical sensing-switching type, such as limit switching, photoelectric or acoustic devices or proximity gauges.
- 20 85 4. Apparatus according to any of the preceding claims, wherein the carriage is mounted to be released to move forwardly with material being fed to the apparatus when said material has been clamped, means for assisting said forward movement, and means for returning said carriage to its starting position.
- 25 90 5. Apparatus according to claim 4, wherein the carriage is held in its starting position by retaining means and furnished with forwardly urging gravity means, and control means is provided for releasing said retaining means to enable the carriage to move forwardly with material clamped thereon during the cutting operation.
- 30 95 6. Apparatus according to any of the preceding claims, wherein the carriage is furnished with mounting means capable of enabling different forms of clamping means to be mounted according to requirements and the formation of the material to be clamped, and operating means for causing such clamps to move into and out of their clamping position.
- 35 100 7. Apparatus according to claim 6, wherein the clamp mounting means are controlled by pneumatic operating means and are manually adjustable different positions.
- 40 105 8. Apparatus according to claim 6 or 7, wherein the clamping mounting means are such that clamps may be mounted on either or both sides of the path of the cutting element.
- 45 110 9. Apparatus according to claim 6 or 7, or 8, wherein the clamping means are carried by overhead bridge means operated by piston and cylinder means, said bridge means being adjustable manually to different heights in re-
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lation to its operating means, the arrangement being such that clamps are operated to clamp down on to and/or into material to be cut.

5 10. Apparatus according to any of the preceding claims, wherein the carriage has a flat table top to enable material of different sections to be clamped thereon, and clamping means are mounted to be readily interchangeable to suit different sectional shapes to be cut.

10 11. Apparatus according to any of the preceding claims, wherein the material supporting table, in one or more sections, includes spaced apart guide means, said guide means being furnished with operating means for causing a cut length to be ejected laterally automatically from the table.

15 12. Apparatus according to claim 11, wherein the means for ejecting cut sections of material are controlled by such sections en-

gaging trip means which controls an electrical or pneumatic system.

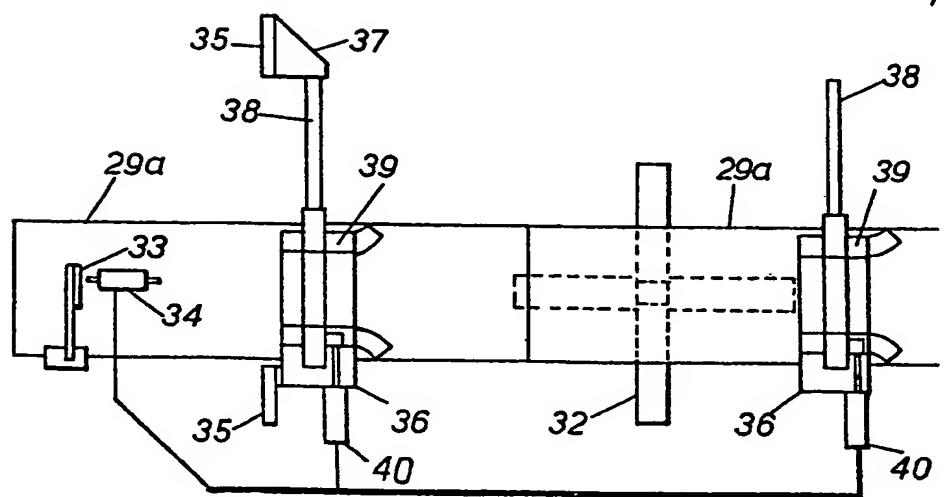
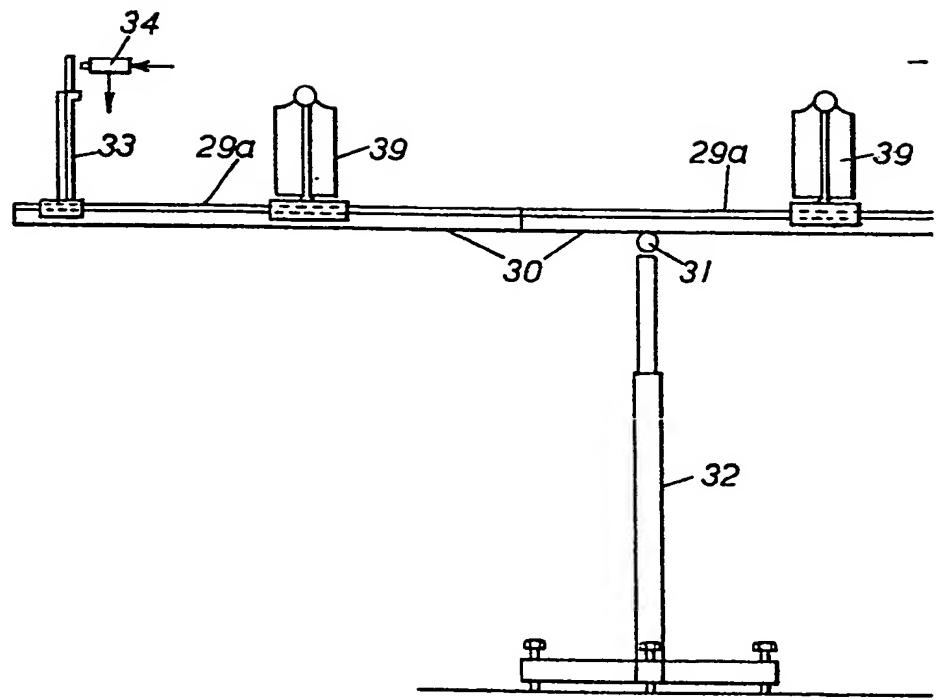
20 13. Apparatus according to any of the preceding claims wherein at least one supporting table is associated with the cutting part table, said supporting table or the first of a series of such tables being hinged to the cutting part table, and floor mounting means for supporting said supporting table or series of tables in a manner that allows such table or tables to have operative linear movement thereon.

25 14. Apparatus for cutting material into sections substantially as described with reference to the accompanying drawings.

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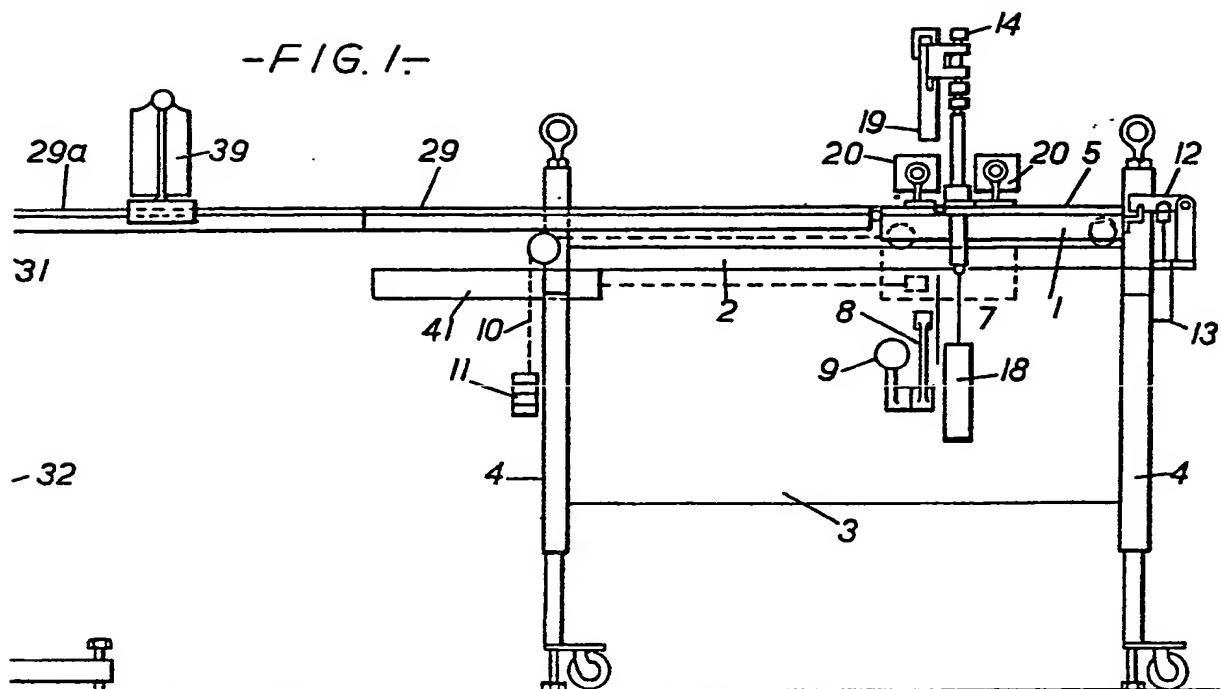
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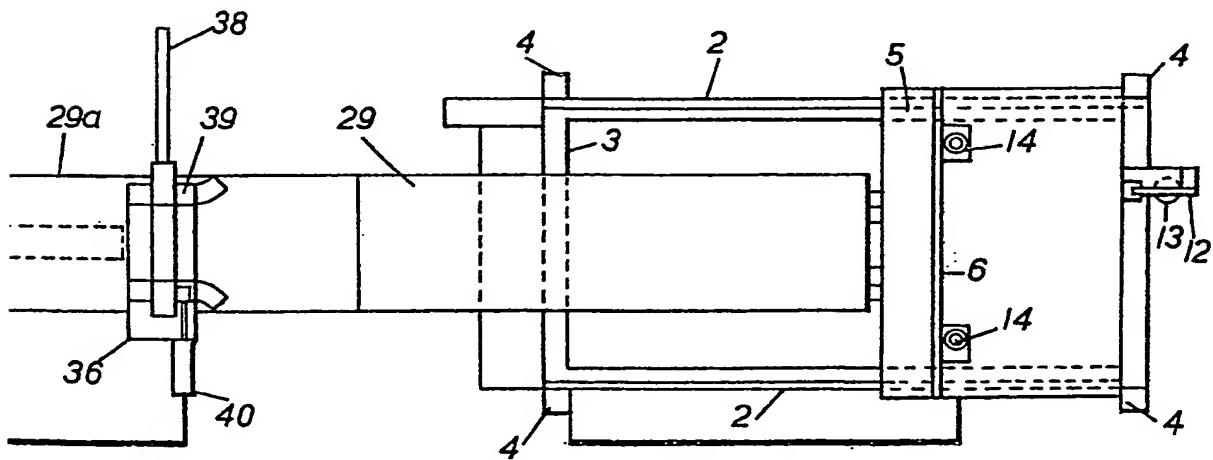
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SHEET 1

-FIG. 1.-

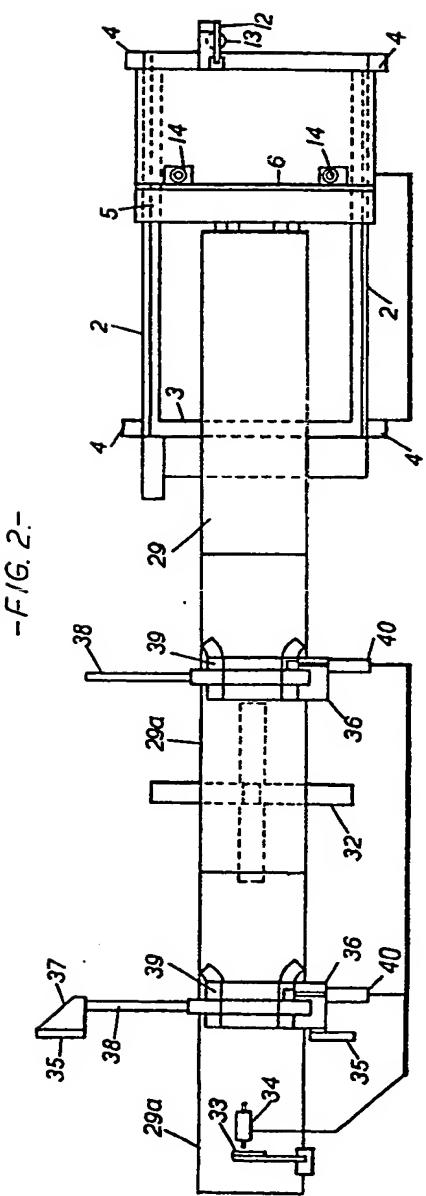
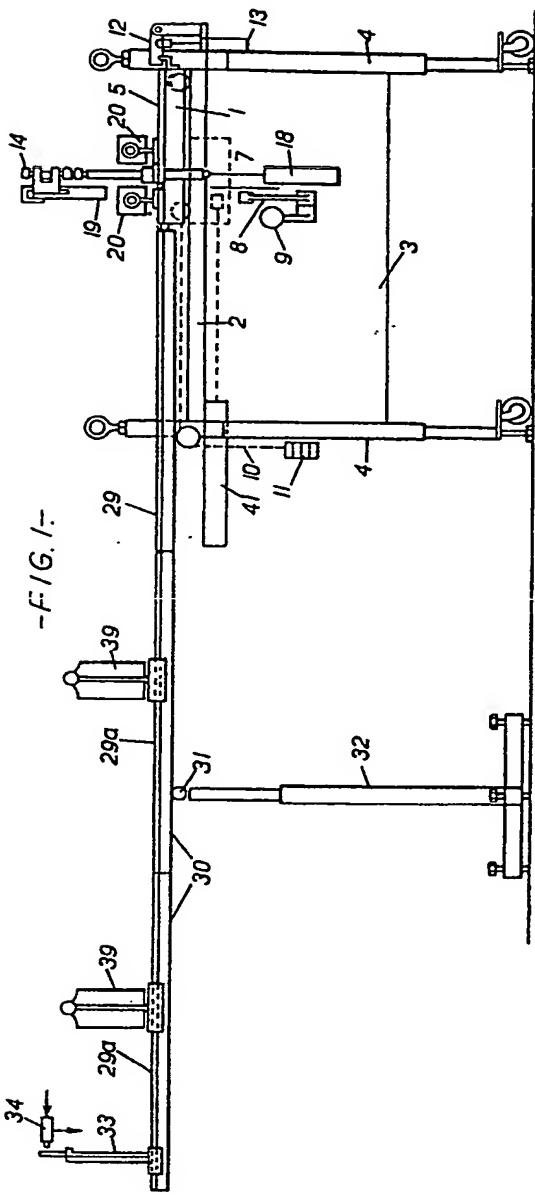


-FIG. 2.-



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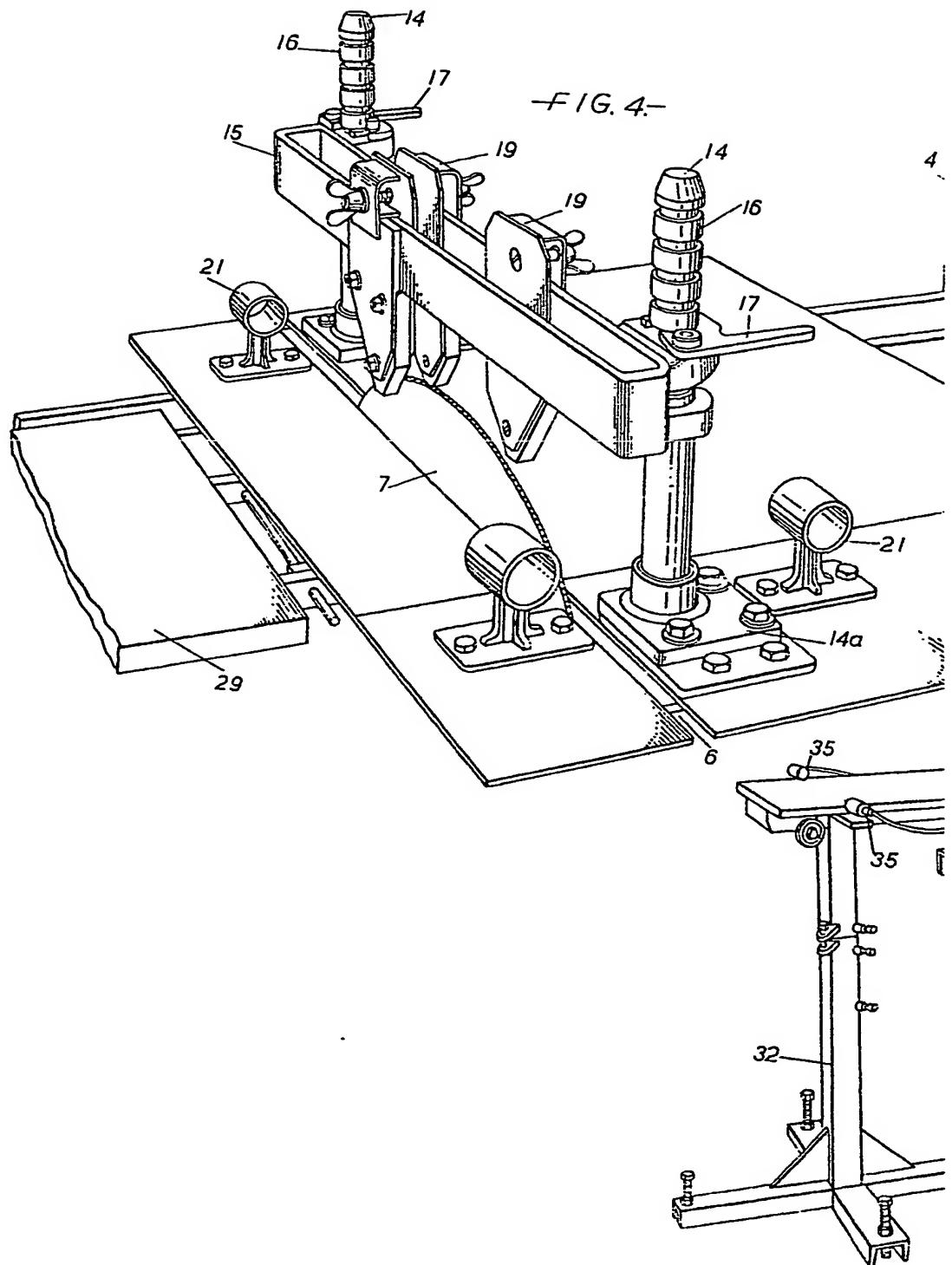
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-FIG. 4-



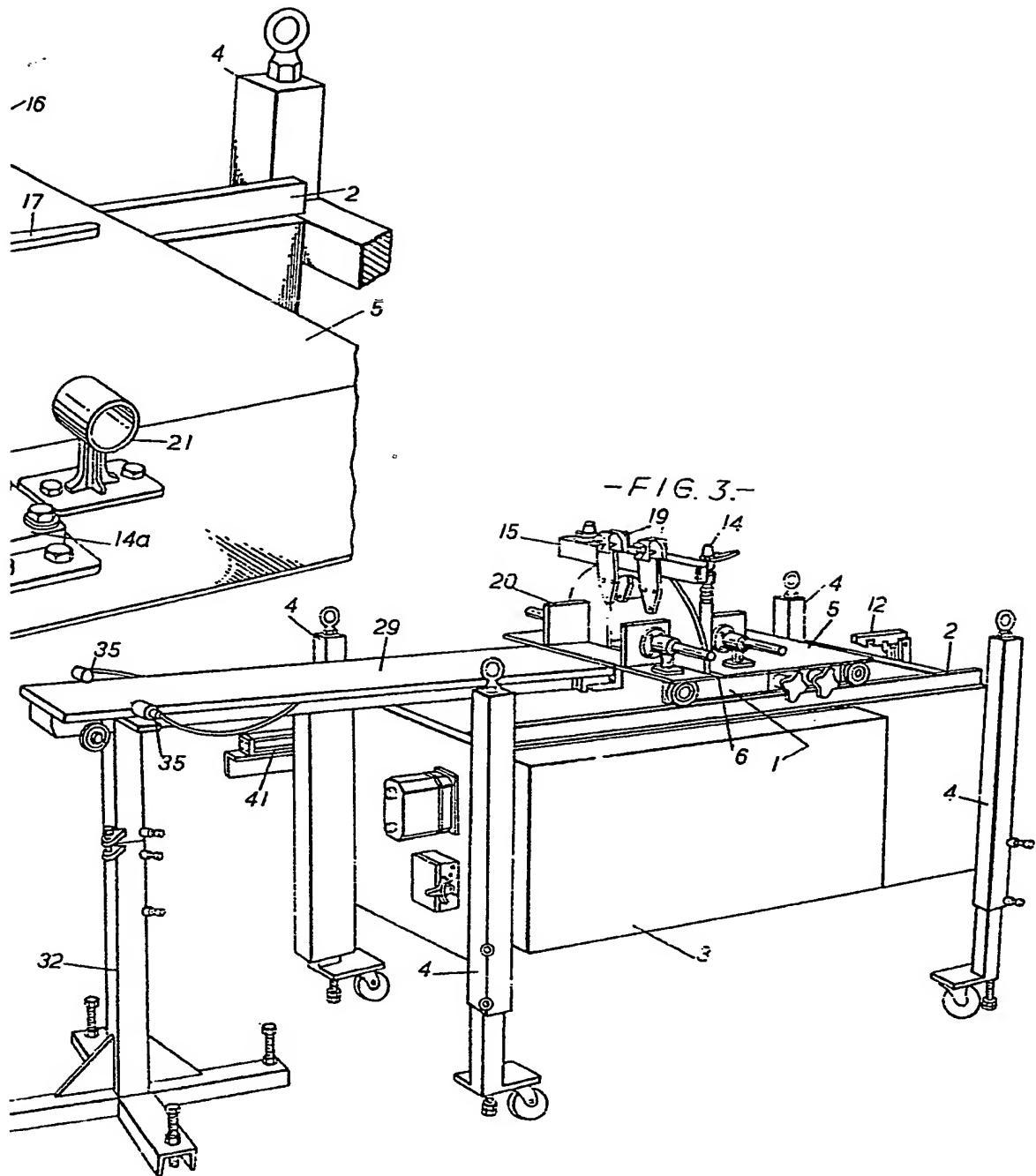
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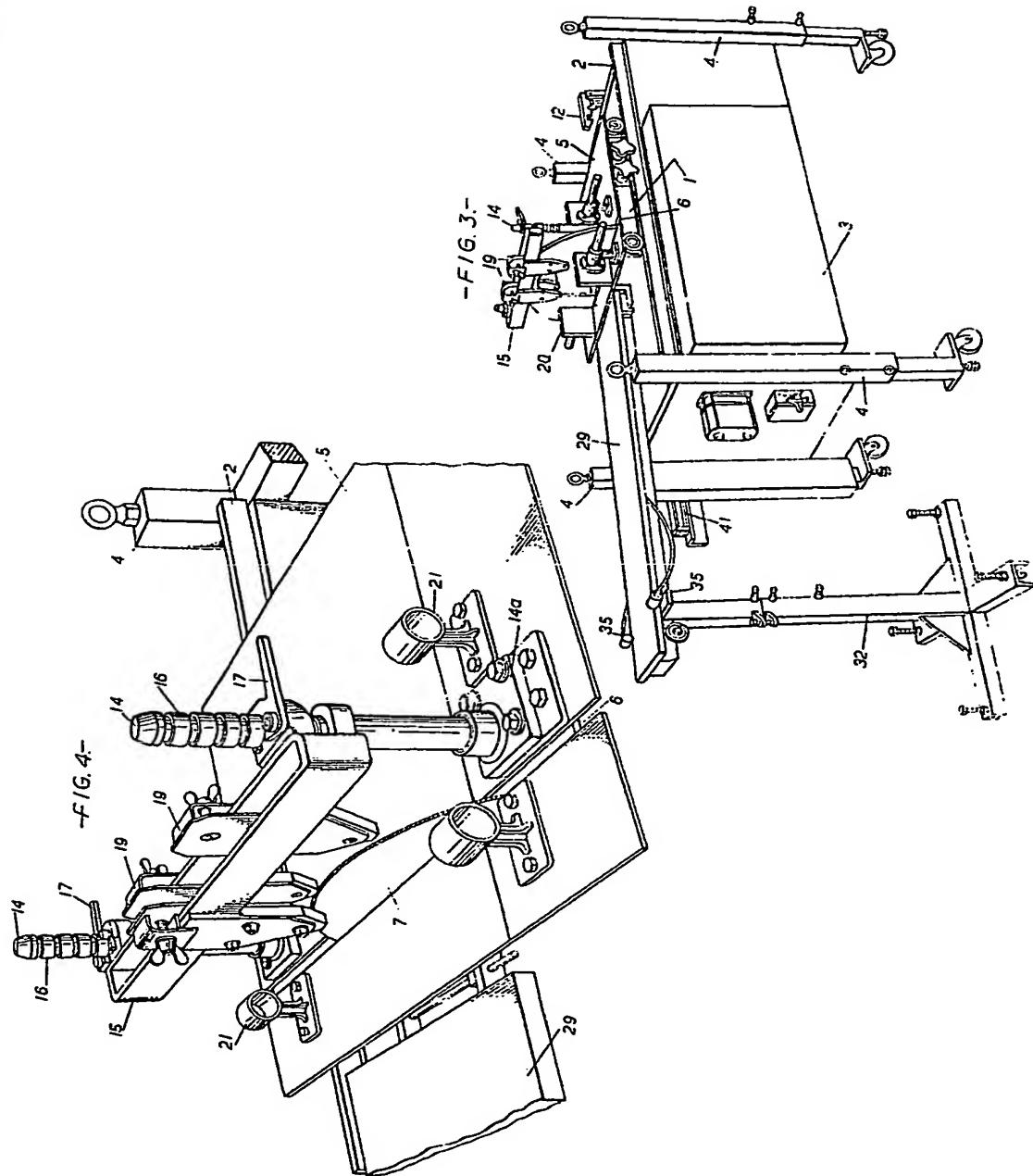
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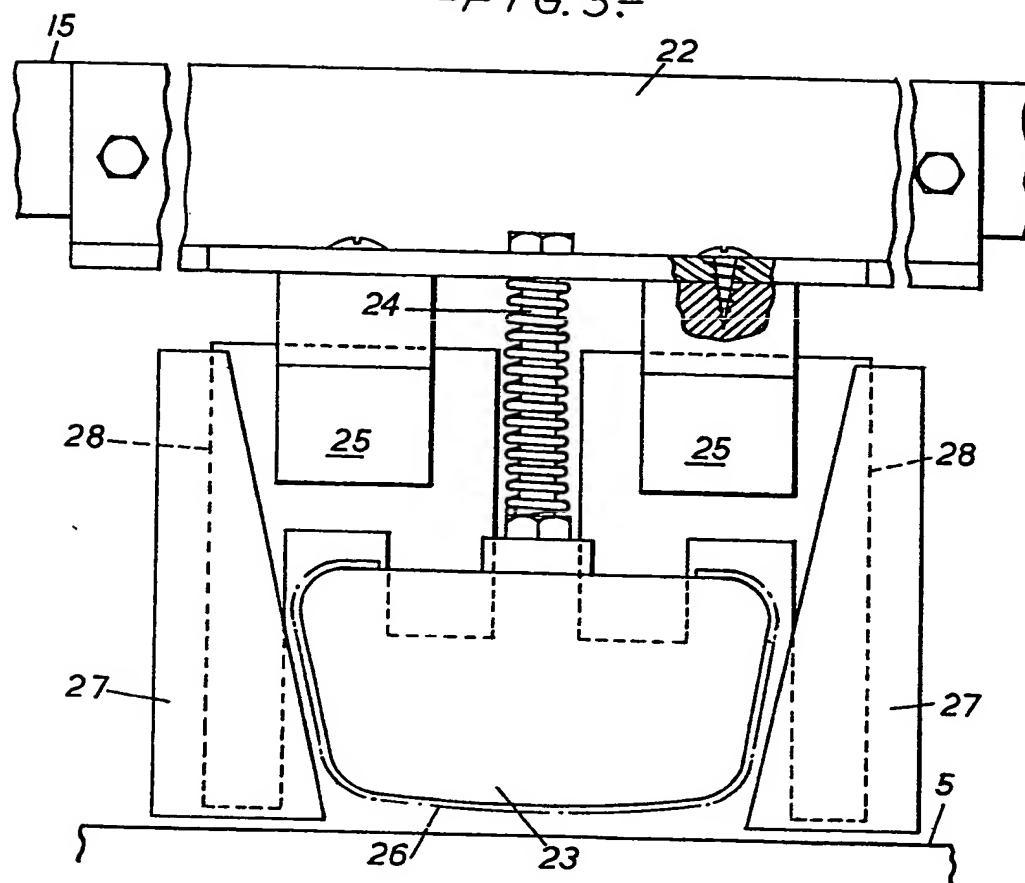
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SHEET 3

-FIG. 5.-



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